

PATENT ABSTRACTS OF JAPAN

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(71)Applicant : NGK INSULATORS LTD

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(72)Inventor : NIIMI TOKUICHI
ASAHI MICHIO

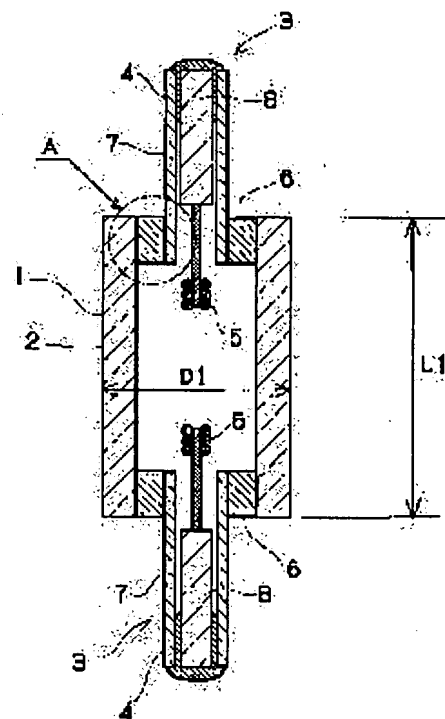
(54) HIGH-PRESSURE DISCHARGE LAMP

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a pseudo-point light source and to stably connect electrode members to a discharge tube by forming each current conductor with a pipe conductor inserted into the opening section of an alumina cylinder and connected by a connecting material and a bar-like conductor inserted into the through-hole of the pipe conductor and having a discharge electrode at the tip, and setting the diameter and length of the alumina cylinder to specific values.

SOLUTION: An alumina cylinder of this high-pressure discharge lamp has a diameter of 1-6 mm 4 and the length of 6-15 mm. Each current conductor 4 is constituted of a metallic pipe conductor 7 and a cylindrical core 8 in it, and they are connected by

welding at end sections. A discharge electrode 5 is provided at the tip of the core 8, and they are connected by welding or metallization connection. The pipe conductor 7 may be formed with a halide-resistant material, such as W or Mo. The core 8 is preferably formed with the same metal as that of the pipe conductor 7. This discharge lamp can be miniaturized, by connecting the pipe conductor 7 forming the current conductor 4 directly to a discharge tube 1.



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CLAIMS

[Claim(s)]

[Claim 1] It closes, while inserting an electrode member in ends opening of the cylinder object made from an alumina, respectively. It is the high voltage electric-discharge lamp in which the discharge space filled up with ionization photogene and start-up gas was formed in said cylinder. the current which supplies a current for said electrode member to a discharge electrode and a discharge electrode -- a conductor -- forming -- this current -- the pipe which inserts a conductor in opening of said cylinder object made from an alumina, and is joined with a jointing material for corrugated fibreboard -- with a conductor this pipe -- it inserts in the breakthrough of a conductor and has said discharge electrode at a head -- cylindrical -- the high voltage electric-discharge lamp characterized by having formed with the conductor, and having set the diameter of said cylinder object made from an alumina to 1mmphi-6mmphi, and setting die length to 6mm - 15mm.

[Claim 2] the cylinder object made from an alumina, and a current -- the pipe of a conductor -- the high voltage electric-discharge lamp according to claim 1 which formed the jointing material for corrugated fibreboard with a conductor with the porosity frame which consists of the sintered compact of the metal powder which can sink in glass, and the glass wax.

[Claim 3] the principal component of the metal which forms a porosity frame, and a pipe -- a high voltage electric-discharge lamp according to claim 2 with the same principal component of the metal which forms a conductor.

[Claim 4] the pipe of the cylinder object made from an alumina -- a high voltage electric-discharge lamp given in claim 1 thru/or any of 3 they are. [which the bore of ends opening which inserts a conductor has a step, and the diameter of is expanded and changes]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the high voltage electric-discharge lamp which used the discharge tube made from an alumina, especially, it miniaturizes and this invention relates to the high voltage electric-discharge lamp formed into the false point light source.

[0002]

[Description of the Prior Art] As a headlight for automobiles, the high voltage electric-discharge lamp which used the discharge tube made from a quartz has been used widely because of advantages, such as the brightness, height of luminous efficiency, etc. Since the discharge tube is transparent, the light-emitting part by the luminescence gas in the discharge tube is treated as the light source of a electric-discharge lamp as it is and things are made, the electric-discharge lamp using such a quartz tube can be treated as the point light source, and is used as the light source of the lighting which needs the point light source like a headlight.

[0003]

[Problem(s) to be Solved by the Invention] However, if the high voltage electric-discharge lamp using the quartz tube as the discharge tube is continuing and is used for a long period of time, the corrosion of a quartz tube progresses with staining substances, such as a halogenide enclosed inside, a devitrification phenomenon appears, and it conceals the light source section, will be in the condition that the whole quartz tube is emitting light, and has the problem with which it becomes impossible to deal as the point light source. Moreover, the flux of light also decreased and the life as the point light source was not so long as about 2000 hours.

[0004] Therefore, to the halogenide, it is stable and utilization to the head lamp of the high voltage electric-discharge lamp using the ceramic discharge tube created with the long alumina of a life compared with the quartz is considered. Since this discharge tube made from an alumina is translucent, when luminescence between internal discharge electrodes sees from the discharge tube outside, it will be in the same condition as the whole discharge tube is emitting light. Therefore, the whole discharge tube had to be regarded as the emitter and it corresponded by making the discharge tube small, for forming the false point light source.

[0005] Drawing 5 was inserting and closing the electrode member 23 which is the cross-section explanatory view showing one example of such a conventional high voltage electric-discharge lamp, formed the capillary 22 which consists of oxidation insulators, such as an alumina, like the ends of the discharge tube 21 which consists of the barrel made from an alumina, and formed the discharge electrode 24 at the head at the breakthrough of a capillary. In this configuration, it was possible to have formed small to whole die length of $L = 10\text{mm}$ and the diameter of about $D = 3\text{mm}$ of the discharge tube, but it was easy to generate a crack from the difference among both thermal expansion properties, and the joint (closure section) of a capillary 22 and the electrode member 23 had become the big factor which bars reinforcement.

[0006] Then, this invention uses the discharge tube made from an alumina in view of the above-

mentioned trouble, and the formation of the false point light source is possible, and let it be a technical problem to realize the high voltage electric-discharge lamp which stabilized junction to an electrode member and the discharge tube also as for **.

[0007]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, invention of claim 1 It closes, while inserting an electrode member in ends opening of the cylinder object made from an alumina, respectively. It is the high voltage electric-discharge lamp in which the discharge space filled up with ionization photogene and start-up gas was formed in said cylinder. the current which supplies a current for said electrode member to a discharge electrode and a discharge electrode -- a conductor -- forming -- this current -- the pipe which inserts a conductor in opening of said cylinder object made from an alumina, and is joined with a jointing material for corrugated fibreboard -- with a conductor this pipe -- it inserts in the breakthrough of a conductor and has said discharge electrode at a head -- cylindrical -- it is characterized by having formed with the conductor, and having set the diameter of said cylinder object made from an alumina to 1mmphi-6mmphi, and setting die length to 6mm - 15mm.

[0008] invention of claim 2 -- invention of claim 1 -- setting -- the cylinder object made from an alumina, and a current -- the pipe of a conductor -- it is characterized by forming a jointing material for corrugated fibreboard with a conductor with the porosity frame which consists of the sintered compact of the metal powder which can sink in glass, and a glass wax.

[0009] the principal component of the metal with which invention of claim 3 forms a porosity frame in invention of claim 2, and a pipe -- it is characterized by the principal component of the metal which forms a conductor being the same.

[0010] invention of claim 4 -- claim 1 thru/or invention [which / of 3] -- setting -- the pipe of the cylinder object made from an alumina -- the bore of ends opening which inserts a conductor has a step, and is expanded [the diameter of it] and constituted.

[0011]

[Embodiment of the Invention] Hereafter, the gestalt of the operation which materialized this invention is explained to a detail based on a drawing. Drawing 1 is the cross-section explanatory view of the high voltage electric-discharge lamp concerning this invention, insertion closure of the direct electrode member 3 is carried out at ends opening 2a of the discharge tube 1 which consists of the cylinder object 2 made from an alumina, and photogene and start-up gas, such as a halogenated compound, are enclosed with the interior. the cylinder object 2 is formed with the simple cylinder formed with the polycrystal alumina -- having -- moreover, the electrode member 3 -- a current -- it is formed from a conductor 4 and the discharge electrode 5 installed at the head, and connection between the discharge tube 1 and the electrode member 3 is made through the jointing material for corrugated fibreboard 6 mentioned later.

[0012] Although formed with the filament which fixed at the rod of a tungsten, and its head, a discharge electrode 5 may be formed only with the rod of a mere tungsten in order to attain a miniaturization. moreover, a current -- a conductor 4 consists of a metal pipe (pipe conductor 7) and the core material 8 of the shape of a cylindrical shape formed in the interior, and weldbonding of the both sides is carried out at the end. Moreover, a discharge electrode 5 is formed at the head of a core material 8, and is joined by welding or metallizing junction. moreover, a pipe -- molybdenum is being used for a conductor 7 here that what is necessary is just to form by halogenide-proof matter, such as a tungsten and molybdenum. and the core material 8 -- a pipe -- it is desirable to form with the same metal as a conductor 7. thus, the conventional capillary -- losing -- a current -- the pipe which constitutes a conductor -- a electric-discharge lamp can be miniaturized by joining a conductor to the direct discharge tube 1.

[0013] By the way, when using the high voltage electric-discharge lamp using the discharge tube made from an alumina for the head lamp for automobiles, as mentioned above, it is necessary to miniaturize, and the die length of the discharge tube is specifically 15mm or less, and the diameter is wanted to be below 6mmphi. However, the arc length of the internal discharge section is needed 1mm - about 5mm. If it is in the configuration of this point and drawing 1, if the die length L1 of the cylinder object 2 made

from an alumina which is the discharge tube 1 is 6mm or more, it can form the arc length of 1mm or more in the interior, and since the direct electrode member 3 is attached in the discharge tube, the diameter D1 of the discharge tube 1 can be made small to 1mmphi. Therefore, the high voltage electric-discharge lamp suitable as the point light sources, such as a headlight for automobiles, formed into the false point light source can be obtained by the above-mentioned configuration. In addition, the minimum value of a discharge tube diameter is determined by the bulb wall loading at the time of lamp actuation, and it is checked by experiment that the bulb wall loading which is practical as a high voltage electric-discharge lamp is [more than at least 15 lumen //cm / 2 (thickness of 0.25mm)] required.

[0014] next, the cylinder object 2 and a pipe -- the jointing material for corrugated fibreboard 6 which joins a conductor 7 is explained. This jointing material for corrugated fibreboard 6 carries out impregnation of the glass wax 11 to the metal (it considers as the porosity frame 10 below) formed in porosity, and is formed. The porosity frame 10 has the open pore with the sintered compact of metal powder. here -- a pipe -- in order to make a joint property with a conductor good -- a pipe -- although formed from the sintered compact of the molybdenum powder which is the same metal as a conductor 7, as an ingredient of metal powder, pure metals, such as a tungsten and a rhenium, and those alloys can be used for others.

[0015] creation of the porosity frame 10 and the cylinder object 2 made from an alumina, and a pipe -- junction to a conductor 7 is explained based on polar-zone closure process drawing of drawing 2. First, metal powder is prepared, and it grinds and dries, and binders, such as ethyl cellulose or acrylic resin, are added and ****(ed), it is made the shape of a paste, and porosity frame material 10a is obtained. the paste -- a predetermined part, i.e., a pipe, -- it applies to the side face of a conductor 7 in the shape of a ring (process 2), and is made to dry at 20 degrees C - 60 degrees C This temporary-quenching object is calcinated at the temperature of 1200 degrees C - 1700 degrees C under the reducing atmosphere, inert gas ambient atmosphere, or vacuum of 20 degrees C - 50 degrees C of dew-points (process 3). the porosity frame 10 which has an open pore by carrying out like this -- a pipe -- it can form in the joint of a conductor 7.

[0016] In addition, as for the rate of an open pore of the porosity frame 10, it is desirable to consider as 30% or more and 40 more% or more, and it can make reinforcement of a junction field still higher by this. Moreover, as for the rate of the said open pore, it is desirable to consider as 80% or less and 70 more% or less, it can carry out impregnation of the glass material moderately into the open pore of a porosity frame by this, can distribute the stress which joins a porosity frame, and can raise the endurance over a heat cycle. Moreover, in order to make the impregnation glass layer which carried out impregnation of the glass wax 11 to such a porosity frame 10 generate moderately, it is desirable to carry out tap density of the metal powder which is the raw material of the porosity frame 10 in 2.5-3.5g/cc.

[0017] next, the process 4 -- the cylinder object 2 -- a pipe -- specified quantity insertion of the conductor 7 is carried out, the glass wax 11 is attached to the seal section, and heating melting of the glass is carried out -- making -- a pipe -- a clearance is closed while joining a conductor 7 to the cylinder object 2 (process 5). In addition, as for the glass wax 11, it is desirable to be constituted by the construction material chosen from the group which consists of aluminum2O3, SiO2, Y2O3, Dy2O3, and B-2s O3 and MoO3, and it is desirable to contain aluminum2O3 and SiO2 especially. And a glass wax is obtained by cracking the prepared powder thru/or frit so that it may become 60 % of the weight of predetermined glass presentations, for example, an oxidization dysprosium, 15 % of the weight of aluminas, and 25 % of the weight of silicas, adding, corning and carrying out press forming of the binders, such as polyvinyl alcohol, and degreasing. Moreover, the glass wax which is attached to a porosity frame and to attach is good to fabricate in the shape of a ring beforehand.

[0018] and the core material 8 which finally formed the discharge electrode 5 at the process 6 -- a pipe -- it inserts in a conductor 7, an edge is welded, and both sides are joined and closed.

[0019] in this way, the formed pipe -- the joint of a conductor 7 and the cylinder object 2 As shown in drawing 3 which is the amplification explanatory view of the A section of drawing 1, the attached glass wax 11 when it fuses, it sinks in into the open pore of the porosity frame 10, and the main phase 12

which consists of the porosity frame 10 and an impregnation glass phase is formed, and the fused glass surfaces the porosity frame 10 slightly from the front face of the cylinder object 2 further -- making -- a pipe -- the interface glass layer 13 is made to generate between a conductor 7 and the cylinder object 2 therefore, a pipe -- the wettability badness of a conductor 7 and the glass wax 11 improves -- having -- the porosity frame 10 -- minding -- the glass wax 11 -- a pipe -- it joins to a conductor 7 certainly and the cylinder object 2 made from an alumina is certainly joined with the wettability good glass wax 11. namely, a current -- a conductor 4 and the discharge tube are joined certainly -- it carries out and a glass wax carries out the hermetic seal of the clearance. thus, the pipe formed with the cylinder object made from an alumina, and the metal -- junction to a conductor can be ensured. Furthermore, though the crack has occurred in the interface glass layer, since a porosity frame prevents the progress, reinforcement can be attained. moreover, a porosity frame and a pipe -- since [the principal component of a conductor] it is the same -- a porosity frame -- a pipe -- it is firmly joined to a conductor.

[0020] Drawing 4 shows other configurations of a cylinder object, and the cylinder object 15 forms a step 16 in the electrode member insertion point of ends opening 15a, and the diameter of it is expanded. thus, the time of inserting the electrode member 3 and joining by forming a step 16, -- a jointing material for corrugated fibreboard 6 or a pipe -- since a conductor 7 can position in contact with a step 16 in a predetermined insertion point, a highly precise joint can be formed smoothly.

[0021] In addition, although the gestalt of the above-mentioned implementation described on the assumption that utilization to the head lamp for automobiles, the high voltage electric-discharge lamp point-light-source-ized [above] can also be used also as the light source which needs the point light sources, such as an object for OHP (overhead projector), or a liquid crystal projector.

[0022]

[Effect of the Invention] according to [as explained in full detail above] invention of claim 1 -- the conventional capillary section -- a pipe -- a conductor -- carrying out -- a current -- the component of a conductor -- carrying out -- a current -- a electric-discharge lamp can be miniaturized and formed into the false point light source by joining a conductor and a cylinder object directly, and it can consider as a thing suitable as the point light sources, such as a headlight for automobiles.

[0023] according to invention of claim 2 -- the effect of the invention of claim 1 -- in addition, the pipe formed with the cylinder object made from an alumina, and the metal -- junction to a conductor can be ensured and reinforcement can be attained that it is hard to progress though the crack has occurred on glass.

[0024] according to invention of claim 3 -- the effect of the invention of claim 2 -- in addition, a porosity frame and a pipe -- since the principal component of a conductor is the same -- a porosity frame -- a pipe -- it can be made to join to a conductor firmly

[0025] According to invention of claim 4, in addition to claim 1 thru/or which effect of the invention of 3, dialing operation can be smoothly performed by preparing a step in the insertion section of an electrode member.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the cross-section explanatory view of the high voltage electric-discharge lamp in which one example of the gestalt of operation of this invention is shown.

[Drawing 2] It is the explanatory view of the closure process of the polar zone of drawing 1 .

[Drawing 3] It is the amplification explanatory view of the A section of drawing 1 .

[Drawing 4] It is the cross-section explanatory view of the high voltage electric-discharge lamp in which the gestalt of other operations of this invention is shown.

[Drawing 5] It is the cross-section explanatory view of the high voltage electric-discharge lamp using the conventional discharge tube made from an alumina.

[Description of Notations]

1 .. the discharge tube and 2 .. the cylinder object made from an alumina, and 2a .. opening and 3 .. an electrode member and 4 .. a current -- a conductor and 5 .. a discharge electrode and 6 .. a jointing material for corrugated fibreboard and 7 .. a pipe -- a conductor and 8 .. a core material and 10 .. a porosity frame and 11 .. a glass wax and 12 -- .. -- the main phase of a joint, and 13 .. -- the interface glass layer of a joint, and 15 -- .. -- a cylinder object and 15a -- .. -- opening and 16 .. -- a diameter expansion step.

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(71) 出願人 000004064

日本碍子株式会社

愛知県名古屋市長区須田町2番56号

(72) 発明者 新見 徳一

名古屋市長区須田町2番56号 日本碍子株式会社内

(72) 発明者 浅井 道生

名古屋市長区須田町2番56号 日本碍子株式会社内

(74) 代理人 100078721

弁理士 石田 喜樹

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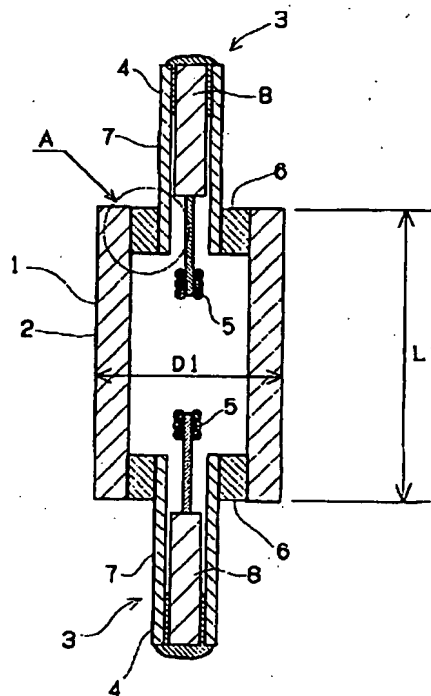
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(54) 【発明の名称】 高圧放電灯

(57) 【要約】

【課題】 アルミナ製放電管を使用し、擬似点光源化が可能で而も電極部材と放電管との接合を安定させた高圧放電灯を実現する。

【解決手段】 単純なアルミナ製円筒体2から成る放電管1の両端開口部2aに、モリブデン製のパイプ導体7とその中に設けられた放電電極5を有するモリブデン製芯材8とから成る電極部材3を挿入し、接合材6で双方を接合し封止した。接合材6はモリブデン粉末の焼結体で開気孔を有する多孔質骨格10にガラスろう1を含浸させて形成した。



【特許請求の範囲】

【請求項 1】 アルミナ製円筒体の両端開口部に電極部材をそれぞれ挿入すると共に封止し、イオン化発光物質及び始動ガスを充填した放電空間を前記円筒内に形成した高圧放電灯であって、前記電極部材を、放電電極と放電電極に電流を供給する電流導体とで形成し、該電流導体を、前記アルミナ製円筒体の開口部に挿入して接合材により接合されるパイプ導体と、該パイプ導体の貫通孔に挿入し、前記放電電極を先端に有する棒状導体とで形成し、前記アルミナ製円筒体の直径を $1\text{mm}\phi \sim 6\text{mm}\phi$ とし、且つ長さを $6\text{mm} \sim 15\text{mm}$ としたことを特徴とする高圧放電灯。

【請求項 2】 アルミナ製円筒体と電流導体のパイプ導体との接合材を、ガラスを含浸可能な金属粉末の焼結体から成る多孔質骨格とガラスろうとで形成した請求項 1 記載の高圧放電灯。

【請求項 3】 多孔質骨格を形成する金属の主成分とパイプ導体を形成する金属の主成分が同一である請求項 2 記載の高圧放電灯。

【請求項 4】 アルミナ製円筒体のパイプ導体を挿入する両端開口部の内径は段部を有し、拡張されて成る請求項 1 乃至 3 の何れかに記載の高圧放電灯。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、アルミナ製放電管を使用した高圧放電灯に関し、特に小型化して擬似点光源化した高圧放電灯に関する。

【0002】

【従来の技術】 自動車用ヘッドライトとして、石英製の放電管を使用した高圧放電灯が、その明るさや発光効率の高さ等の利点のために広く使用されてきている。このような石英管を用いた放電灯は、放電管が透明であるため放電管内の発光ガスによる発光部をそのまま放電灯の光源として扱えることができるので、点光源として扱うことができ、ヘッドライトのような点光源を必要とする照明の光源として利用されている。

【0003】

【発明が解決しようとする課題】 しかし、石英管を放電管として用いた高圧放電灯は、長期に亘り使用していると、内側に封入されているハロゲン化合物等の腐食性物質により石英管の腐食が進み、失透現象が現れて光源部を隠蔽し、あたかも石英管全体が発光しているような状態となってしまう、点光源として扱うことができなくなってしまう問題を有している。また、光束も減少し、点光源としての寿命は 2000 時間程度とそれほど長いものではなかった。

【0004】 そのため、ハロゲン化合物に対して安定であり、石英に比べて寿命の長いアルミナで作成したセラミック放電管を用いた高圧放電灯のヘッドランプへの利用が検討されている。このアルミナ製放電管は半透明であ

るため、内部の放電電極間での発光が放電管外部から見た場合、放電管全体が発光しているのと同じ状態になる。そのため、放電管全体を発光体と見なければならず、擬似点光源化するには放電管を小さくすることで対応していた。

【0005】 図 5 はそのような従来の高圧放電灯の 1 例を示す断面説明図であり、アルミナ製円筒体から成る放電管 21 の両端に同様にアルミナ等の酸化絶縁体から成るキャピラリ 22 を設けて、キャピラリの貫通孔に、先端に放電電極 24 を設けた電極部材 23 を挿入して封止していた。この構成の場合、全体の長さ $L = 10\text{mm}$ 、放電管の直径 $D = 3\text{mm}$ 程度まで小さく形成することが可能であるが、キャピラリ 22 と電極部材 23 との接合部（封止部）が双方の熱膨張特性の違いからクラックが発生し易く、長寿命化を妨げる大きな要因となっていた。

【0006】 そこで、本発明は上記問題点に鑑み、アルミナ製放電管を使用し、擬似点光源化が可能で而も電極部材と放電管との接合を安定させた高圧放電灯を実現することを課題とする。

【0007】

【課題を解決するための手段】 上記課題を解決するため、請求項 1 の発明は、アルミナ製円筒体の両端開口部に電極部材をそれぞれ挿入すると共に封止し、イオン化発光物質及び始動ガスを充填した放電空間を前記円筒内に形成した高圧放電灯であって、前記電極部材を、放電電極と放電電極に電流を供給する電流導体とで形成し、該電流導体を、前記アルミナ製円筒体の開口部に挿入して接合材により接合されるパイプ導体と、該パイプ導体の貫通孔に挿入し、前記放電電極を先端に有する棒状導体とで形成し、前記アルミナ製円筒体の直径を $1\text{mm}\phi \sim 6\text{mm}\phi$ とし、且つ長さを $6\text{mm} \sim 15\text{mm}$ としたことを特徴とする。

【0008】 請求項 2 の発明は、請求項 1 の発明において、アルミナ製円筒体と電流導体のパイプ導体との接合材を、ガラスを含浸可能な金属粉末の焼結体から成る多孔質骨格とガラスろうとで形成したことを特徴とする。

【0009】 請求項 3 の発明は、請求項 2 の発明において、多孔質骨格を形成する金属の主成分とパイプ導体を形成する金属の主成分が同一であることを特徴とする。

【0010】 請求項 4 の発明は、請求項 1 乃至 3 の何れかの発明において、アルミナ製円筒体のパイプ導体を挿入する両端開口部の内径は、段部を有し拡張されて構成される。

【0011】

【発明の実施の形態】 以下、本発明を具体化した実施の形態を、図面を基に詳細に説明する。図 1 は本発明に係る高圧放電灯の断面説明図であり、アルミナ製円筒体 2 から成る放電管 1 の両端開口部 2a に直接電極部材 3 が挿入封止され、内部にはハロゲン化合物等の発光物質や始動ガスが封入されている。円筒体 2 は、多結晶アルミ

ナで形成された単純な円筒で形成され、また電極部材3は電流導体4とその先端に設置された放電電極5とから形成され、放電管1と電極部材3との接続は後述する接合材6を介して行われている。

【0012】放電電極5はタングステンの棒体及びその先端に固着されたフィラメントとで形成されているが、小型化を図るため単なるタングステンの棒体のみで形成しても良い。また、電流導体4は、金属製のパイプ（パイプ導体7）とその内部に形成された円柱形状の芯材8とから成り、双方は端部で溶接接合されている。また、放電電極5は芯材8の先端に設けられ、溶接又はメタライズ接合により接合されている。また、パイプ導体7は、例えばタングステン、モリブデン等の耐ハロゲン化合物物質で形成すれば良く、ここではモリブデンを使用している。そして、芯材8はパイプ導体7と同一金属で形成するのが好ましい。このように、従来のキャピラリを無くし、電流導体を構成するパイプ導体を直接放電管1に接合することで、放電灯を小型化することができる。

【0013】ところで、アルミナ製放電管を用いた高圧放電灯を自動車用ヘッドランプに使用する場合、上述したように小型化する必要がある、具体的には放電管の長さが15mm以下で、直径が6mm以下であることが望まれている。但し、内部放電部のアーク長は1mm～5mm程度必要とされている。この点、図1の構成にあつては、放電管1であるアルミナ製円筒体2の長さL1は6mm以上であれば内部に1mm以上のアーク長を形成することが可能であるし、放電管に直接電極部材3を取り付けるため、放電管1の直径D1は1mm以下まで小さくすることが可能である。従つて、上記構成により自動車用ヘッドライト等の点光源として好適な擬似点光源化した高圧放電灯を得ることができる。尚、放電管直径の最小値はランプ作動時の管壁負荷で決定され、高圧放電灯として実用性のある管壁負荷は少なくとも15ルーメン/cm²（肉厚0.25mm）以上必要であることが実験により確認されている。

【0014】次に円筒体2とパイプ導体7とを接合する接合材6について説明する。この接合材6は、多孔質に形成した金属（以下多孔質骨格10とする）にガラスろう11を含浸させて形成されている。多孔質骨格10は金属粉末の焼結体で開気孔を有している。ここでは、パイプ導体との結合特性を良好にするためにパイプ導体7と同一金属であるモリブデン粉末の焼結体から形成しているが、金属粉末の材料としては、他にタングステン、レニウム等の純金属、及びそれらの合金を使用することができる。

【0015】多孔質骨格10の作成及びアルミナ製円筒体2とパイプ導体7との接合を図2の電極部封止プロセス図を基に説明する。まず、金属粉末を調合、粉碎、乾燥し、エチルセルロースもしくはアクリル系樹脂等のバインダーを添加して混連してペースト状にし、多孔質骨

格材10aを得る。そのペーストを所定の部位、即ちパイプ導体7の側面にリング状に塗布し（工程2）、20℃～60℃で乾燥させる。この仮焼体を、露点20℃～50℃の還元雰囲気、不活性ガス雰囲気又は真空中で、1200℃～1700℃の温度で焼成する（工程3）。こうすることで、開気孔を有する多孔質骨格10をパイプ導体7の接合部に形成することができる。

【0016】尚、多孔質骨格10の開気孔率は30%以上、更には40%以上とすることが好ましく、これによって接合領域の強度を一層高くできる。また、同開気孔率は80%以下、更には70%以下とすることが好ましく、これによって多孔質骨格の開気孔中にガラス材を適度に含浸させ、多孔質骨格に加わる応力を分散させ、熱サイクルに対する耐久性を向上させることができる。また、このような多孔質骨格10にガラスろう11を含浸させた含浸ガラス層を適度に生成させるためには、多孔質骨格10の原料である金属粉末のタップ密度を2.5～3.5g/ccとすることが好ましい。

【0017】次に、工程4で円筒体2にパイプ導体7を所定量挿入し、ガラスろう11をシール部に添付し、ガラスを加熱溶融させてパイプ導体7を円筒体2に接合すると共に隙間を封止する（工程5）。尚、ガラスろう11は、Al₂O₃、SiO₂、Y₂O₃、Dy₂O₃、B₂O₃及びMoO₃から成る群より選ばれた材質によって構成されることが好ましく、特にAl₂O₃とSiO₂とを含有していることが好ましい。そして、所定のガラス組成、例えば酸化ジスプロシウム60重量%、アルミナ15重量%、シリカ25重量%となるように調合された粉末ないしフリットを解砕し、ポリビニルアルコール等のバインダーを添加し、造粒し、プレス成形し、脱脂することによって、ガラスろうを得る。また、多孔質骨格に添付する添付するガラスろうは予めリング状に成形しておくとも良い。

【0018】そして、最後に工程6で、放電電極5を設けた芯材8をパイプ導体7に挿入し、端部を溶接し、双方を接合し封止する。

【0019】こうして形成したパイプ導体7と円筒体2との接合部は、図1のA部の拡大説明図である図3に示すように、添付されたガラスろう11が、溶融した際に多孔質骨格10の開気孔中に含浸し、多孔質骨格10と含浸ガラス相から成る主相12を形成し、更に、溶融したガラスは多孔質骨格10を円筒体2の表面から僅かに浮上させ、パイプ導体7と円筒体2との間に界面ガラス層13を生成させる。そのため、パイプ導体7とガラスろう11との濡れ性の悪さは改善され、多孔質骨格10を介しガラスろう11はパイプ導体7と確実に接合するし、アルミナ製の円筒体2とは濡れ性の良いガラスろう11により確実に接合される。即ち電流導体4と放電管とは確実に接合されるし、ガラスろうが隙間を気密封止する。このように、アルミナ製円筒体と金属で形成され

たパイプ導体との接合を確実に行うことができる。さらに、界面ガラス層にクラックが発生してたとしても多孔質骨格がその進展を阻止するため長寿命化を図ることができる。また、多孔質骨格とパイプ導体の主成分が同一とするため、多孔質骨格をパイプ導体に強固に接合される。

【0020】図4は円筒体の他の形状を示し、円筒体15は、両端開口部15aの電極部材挿入位置に段部16を設けて拡張してある。このように段部16を設けることで、電極部材3を挿入し接合する際、接合材6或いはパイプ導体7が所定挿入位置で段部16に当接して位置決めできるので、スムーズに高精度な接合部を形成することができる。

【0021】尚、上記実施の形態では、自動車用ヘッドランプへの利用を前提に述べたが、上記点光源化した高圧放電灯は、OHP（オーバーヘッドプロジェクタ）用或いは液晶プロジェクタ等の点光源を必要とする光源としても利用することも可能である。

【0022】

【発明の効果】以上詳述したように、請求項1の発明によれば、従来のキャピラリ部をパイプ導体として電流導体の構成要素とし、電流導体と円筒体とを直接接合することで、放電灯を小型化し擬似点光源化することができ、自動車用ヘッドライト等の点光源として好適なものとすることができる。

【0023】請求項2の発明によれば、請求項1の発明の効果に加えて、アルミナ製円筒体と金属で形成された

パイプ導体との接合を確実に行うことができ、ガラスにクラックが発生してたとしても進展し難く長寿命化を図ることができる。

【0024】請求項3の発明によれば、請求項2の発明の効果に加えて、多孔質骨格とパイプ導体の主成分が同一であるため、多孔質骨格をパイプ導体に強固に接合させることができる。

【0025】請求項4の発明によれば、請求項1乃至3の何れかの発明の効果に加えて、電極部材の挿入部に段部を設けることで、接続操作をスムーズに行うことができる。

【図面の簡単な説明】

【図1】本発明の実施の形態の1例を示す高圧放電灯の断面説明図である。

【図2】図1の電極部の封止プロセスの説明図である。

【図3】図1のA部の拡大説明図である。

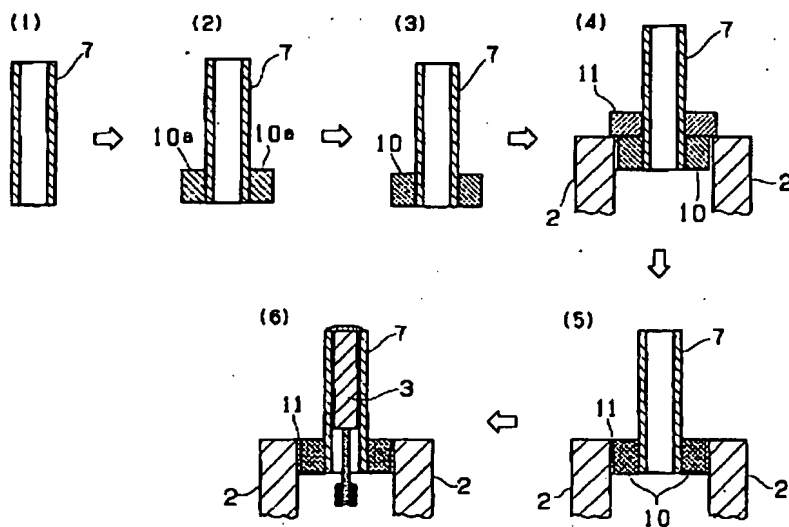
【図4】本発明の他の実施の形態を示す高圧放電灯の断面説明図である。

【図5】従来のアルミナ製放電管を用いた高圧放電灯の断面説明図である。

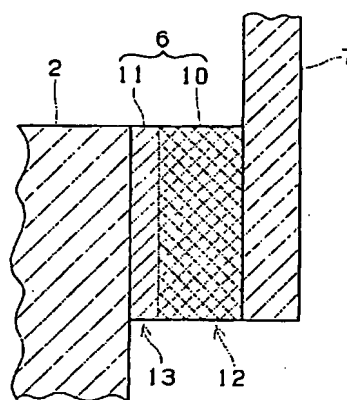
【符号の説明】

1・・・放電管、2・・・アルミナ製円筒体、2a・・・開口部、3・・・電極部材、4・・・電流導体、5・・・放電電極、6・・・接合材、7・・・パイプ導体、8・・・芯材、10・・・多孔質骨格、11・・・ガラスろう、12・・・接合部の主相、13・・・接合部の界面ガラス層、15・・・円筒体、15a・・・開口部、16・・・拡張段部。

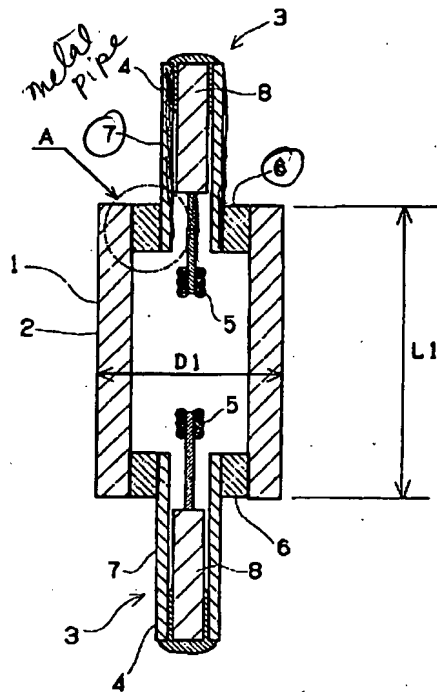
【図2】



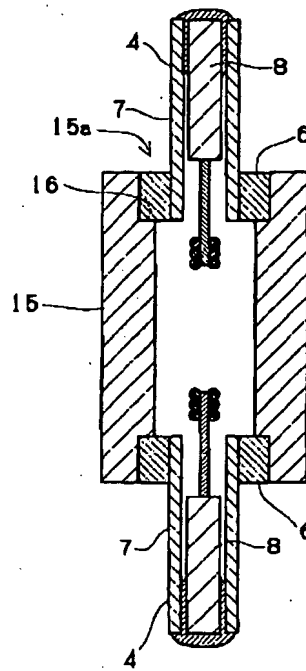
【図3】



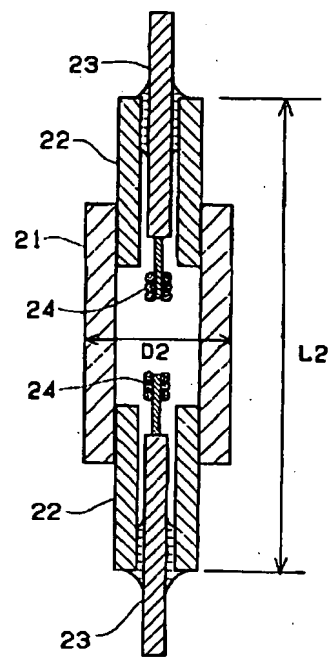
【図1】



【図4】



【図5】



7 = mo. pipe.

8 = molybdenum.

6/15

5/14 = .35